Small Business Innovation Research/Small Business Tech Transfer

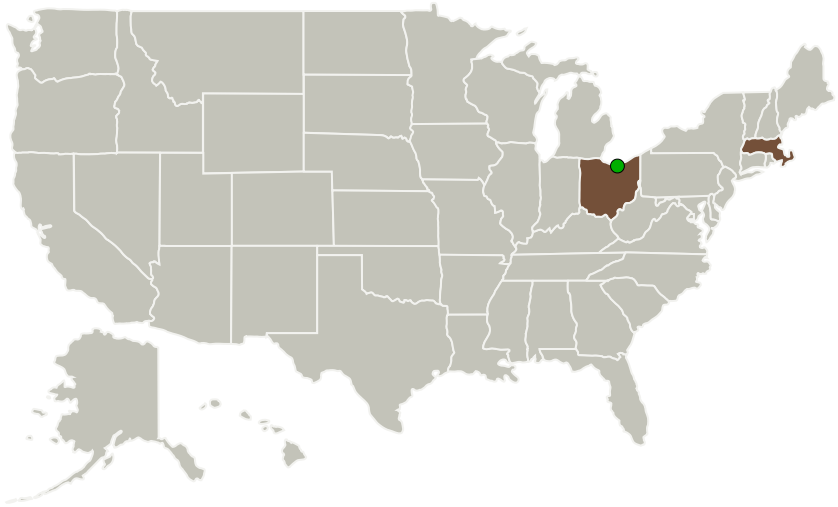
Thin Aerogel as a Spacer in Multi-Layer Insulation for Cryogenic Space Applications, Phase II

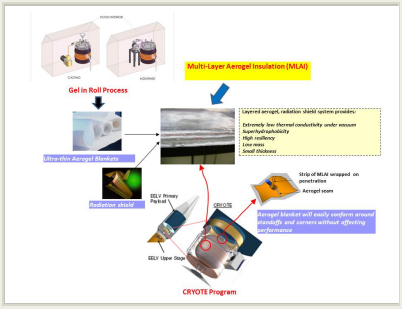
Completed Technology Project (2013 - 2015)

Project Introduction

Cryogenic fluid management (CFM) is a critical technical area that is needed for the successful development for future space exploration. A key challenge is the storability of LH2, LCH4, and LOX propellants for long durations. The storage tanks must be well insulated to prevent over pressurization and venting, which lead to unacceptable propellant losses for long-duration missions to Mars and beyond. Aspen Aerogels validated the key process step for a next generation aerogel manufacturing technology to enable the fabrication of thin, low density aerogel materials. Multi-Layer Aerogel Insulation (MLAI) system prototypes were prepared using sheets of these aerogel materials that have superior thermal performance exceeding that of the current state of the art insulation for space application, MLI, across the vacuum range tested (0.01 – 100 millitorr). The exceptional properties of this system include a new breakthrough in high vacuum cryogenic thermal insulation, providing a durable material with excellent thermal performance at a reduced cost when compared to longstanding state-of-the-art MLI systems. During the Phase II Program, further refinement and qualification/system-level testing of the MLAI system will be performed for use in cryogenic storage applications.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Aspen Aerogels, Inc.	Lead Organization	Industry	Northborough, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

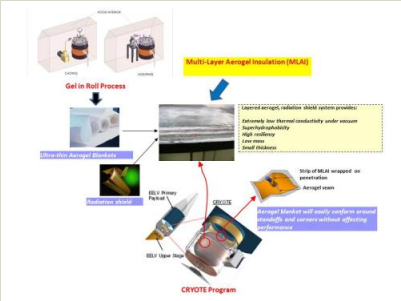
Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

August 2013: Project Start

July 2015: Closed out

Images



Project Image
Thin Aerogel as a Spacer in Multi-Layer Insulation for Cryogenic Space Applications
(https://techport.nasa.gov/image/127283)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Aspen Aerogels, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

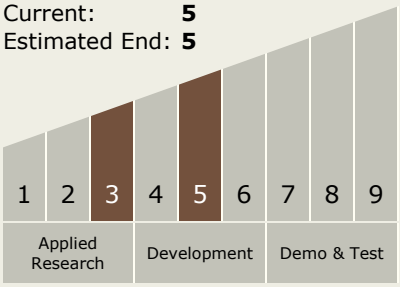
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Nancy Moroz

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Completed Technology Project (2013 - 2015)

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.1 In-space Propellant Storage & Utilization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System